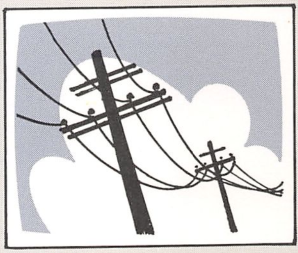

PC-NFS

# Serial Communications Guide

Part No. 814-1032-02 Rev.B, November 1989

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# Preface

The *PC-NFS Serial Communications Guide* describes how to install and use software that supports serial communications between network servers and PCs. Serial Line Internet Protocol (SLIP) gives a PC running PC-NFS™ access to remote systems and networks through direct wiring or by telephone

## Who Should Read This Guide

This guide contains information for Network administrators and PC users.

**Network Administrators.** If you are a Network administrator you should read Chapters 1, 2, and 3 of this guide; you should also read Chapter 4 if you install the PC communications software.

**PC Users.** If you are a PC user, you may be required to install and use the serial communications software on your PCs. For information on SLIP, read Chapter 1. For instructions on installing SLIP on your PC, read Chapter 4.

For troubleshooting problems, all users should refer to Appendix A of this guide.

## What This Guide Contains

This guide has four chapters and an appendix.

| | |
|---|---|
| **Chapter 1:** | What Is SLIP?<br>Contains an introduction to serial communications, and describes how serial networks are different from other networks. |
| **Chapter 2:** | Planning for a SLIP Network<br>Describes how to prepare for your serial network and connections. |
| **Chapter 3:** | Installing SLIP on a Sun System<br>Tells you how to install serial software on your Sun system and how to verify correct installation. |
| **Chapter 4:** | Installing and Using SLIP on Your PC<br>Tells you how to install serial software on your PC and how to use your PC on a serial network. |
| **Appendix A:** | Troubleshooting<br>Describes symptoms of problems that may occur on servers and PCs, and suggests ways to solve them. It also contains annotated error messages. |

## Related Manuals

This guide occasionally refers you to *Installing PC-NFS, A Guide to the User and System Administrator* and to *System Administration* in your SunOS™ documentation set. In addition, you may want to refer to copies of your UNIX® or DOS operating systems documentation.

For more information on PC-NFS, refer to *Installing PC-NFS, A Guide to the User and System Administrator* and the *PC-NFS User's Manual.*

## Conventions Used in This Guide

This guide uses the following conventions:

| | |
|---|---|
| *This type is used* | for emphasis, to introduce a new term, for manual titles, or to indicate a word that you must supply a value for. For example: A *gateway* is a computer that links networks. |
| `This type is used` | to indicate a command, a program or file name, a directory name, messages, or output on a screen, such as menu options. For example: The `hangup` command disconnects you from the gateway. |
| **`This type is used`** | to indicate what you should type. For example: Type **`connect`** at the `C>` prompt. |

Keys are represented by the key name enclosed in a box. For example: Press the Enter key.

This guide represents the UNIX prompt as `%` (the default prompt for a SLIP connection) and the DOS prompt as >.

# What Is SLIP?

## 1

This chapter is an introduction to using PC-NFS over serial communication lines. It includes an overview of Serial Line Internet Protocol (SLIP) and a discussion of SLIP network concepts.

## Overview

PC-NFS allows PC users to get the most out of file sharing, printing, electronic mail, and other resources and information in a network environment.

PC-NFS uses communications protocols collectively called the Internet Protocol (IP). IP encodes data so it can be transmitted across different types of communications links. If you connect a PC and a server using a *serial* communications link, PC-NFS uses Serial Line Internet Protocol (SLIP).

A serial communications link between a PC and its server can be:

- A *dial-up* connection, with a modem and telephone line
- A *direct* connection, with an RS-232 null modem cable

A SLIP connection allows a PC running PC-NFS to connect with a Sun server running a compatible SLIP implementation. The server provides the PC user with the same network applications and environment available to PC users on an Ethernet® or other local area network.

All PC-NFS services and applications work across a SLIP connection, with some limitations on speed. For more information on PC-NFS and networking concepts, refer to the *PC-NFS User's Manual.*

## Why Use SLIP?

A dial-up SLIP connection gives you the flexibility and convenience of using PC-NFS away from your server. If your PC is normally connected to a local area network, you may want to connect to a server from home or from somewhere on the road. A dial-up SLIP connection allows you to do this.

In addition, a serial cable is sometimes the only practical way to connect a PC to a network. For example, serial connections can be used over twisted pair wiring schemes. A direct SLIP connection allows you to do this.

You can easily switch your PC between an Ethernet connection and a SLIP connection by reconfiguring PC-NFS using the `nfsconf` program, and then connecting the appropriate communications equipment to your PC.

## Hardware and Software to Support a SLIP Connection

**On a Sun System.** The PC-NFS SLIP system software is designed for SunOS machines only. This software supports Sun-2™, Sun-3™, Sun-4™, or Sun386i™ systems, running SunOS 3.x or SunOS 4.x. Because this software is supplied in source code form, users may adapt it for use on other systems; however, this is not supported by Sun.

Make sure that the Sun system to be used as the gateway has 1 megabyte or more free disk space to accommodate the distribution software.

You can add additional serial ports to your Sun system by installing third-party serial boards.

For a 386i system, you need the Developer's Toolkit in order to install SLIP.

**On a PC.** A PC must be running MS-DOS™ version 3.1 or later, and PC-NFS version 3.0 or later.

A PC requires an RS-232 null modem cable for a direct connection, or a modem for a dial-up connection.

**Modems and Cables.** The following modems are supported by PC-NFS:

- Hayes® modems and 100% compatibles
- NEC® laptop internal modem
- Telebit TrailBlazer™ (internal and external) modem
- Toshiba T1000® internal modem
- USRobotics external Courier 2400™ modem
- USRobotics internal Microlink 2400™ modem

To use NFS file sharing over a dial-up link, you must use an error-correcting modem. If your modem runs at less that 9600 baud, NFS file sharing is automatically disabled.

Cable or modem connections can use a baud rate of 1200, 2400, 4800, or 9600. A 9600 baud rate gives you the best performance.

Read the manufacturer's instructions carefully to make sure you choose the correct modem setting.

## SLIP Network Concepts

Each SLIP network must have its own name and Internet address. Each PC and each server on a SLIP network must also have its own name and Internet address. The names and addresses must be *different* from the names used for any other network.

The following two figures illustrate the concepts of an Ethernet and a SLIP network.

Figure 1-1 shows an Ethernet network with one server and two clients (a workstation and a PC). The network's name is "`e-net`" and its Internet address is 192.9.200. Each machine on the network also has a name and an Internet address.

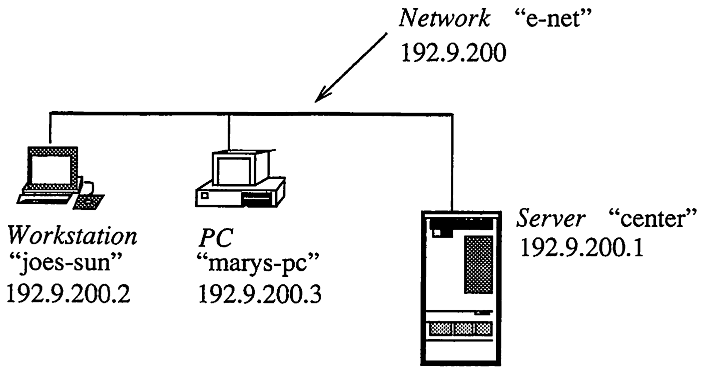


**Figure 1-1** *Sample Ethernet Network*

A *gateway* is a computer that links two or more networks. Figure 1-2 shows the same network as Figure 1-1, with a SLIP network (shown in the shaded area) connected to it through a gateway. The server on the Ethernet network has been configured as the SLIP gateway, and a PC has been added in a SLIP connection. This SLIP connection could be either direct or dial-up.

There are now two networks, each with its own name and address. The server also has two names and addresses, because it is now being used for two separate purposes: as a server for the Ethernet *and* as a gateway for the SLIP network.

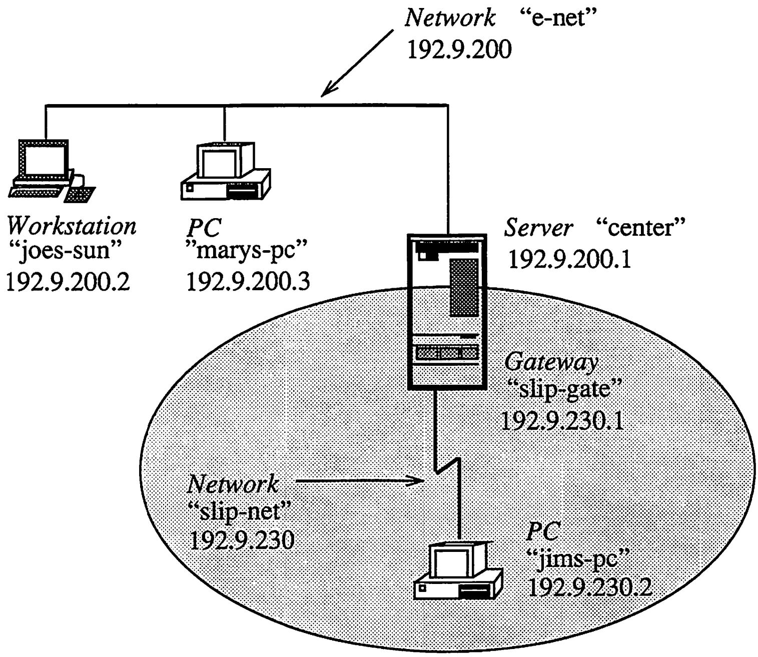


**Figure 1-2** *Sample SLIP Network*

In Figure 1-2, "slip-gate" is the gateway to network "e-net" for SLIP users, and "center" is the gateway to network "slip-net" for e-net users. In this example, both "slip-gate" and "center" gateways reside in a single Sun server. Thus, "jims-pc" can transfer a file to "joes-sun" through its SLIP connection to "slip-gate".

## Limitations Using SLIP

A PC running a SLIP connection functions the same way as one running over an Ethernet connection. However, there are some limitations with SLIP.

Over a SLIP connection, the fastest data can move is at 9600 baud — slower than being on an Ethernet. For example, a large program such as WordPerfect™, containing about 231,000 bytes, takes about 5 seconds to load over an Ethernet connection; the same program takes about 4 minutes to load over a SLIP connection.

**Dial-up restrictions.** Serial communications equipment is generally reliable. When you use a dial-up SLIP connection, however, the potential for electrical interference ("noise") on the line is greater and more unpredictable than over a direct connect cable. Noise can cause data moving over the serial line to be corrupted.

Services such as `telnet`, `ftp`, `rsh`, `rcp`, and PC-NFS LifeLine™ use the TCP protocol, which provides end-to-end data integrity. However, much of PC-NFS is based on the UDP protocol, which in most cases does not include data integrity protection. Using PC-NFS over an error-prone line can lead to data or file system corruption.

Because of this potential for data corruption, you must have an error-correcting modem to use PC-NFS file sharing (such as the ability to mount drives or printers) over a dial-up connection. Therefore, *do not use NFS file sharing over an error-prone line.* If your modem runs at less than 9600 baud, NFS file sharing is automatically disabled. PC-NFS does allow you to override this setting and use file sharing.

# Planning for a SLIP Network

## 2

Chapters 2 and 3 are written for the network administrator. Please read both chapters before you edit any files on your system.

**Assumed knowledge.** Chapters 2 and 3 assume you have knowledge of network concepts, such as Internet addressing and Yellow Pages (YP). For more information about networks, refer to *System Administration* in your SunOS Docubox and *Installing PC-NFS, A Guide to the User and System Administrator*. Chapters 2 and 3 also assume you are familiar with the UNIX operating system. Refer to your UNIX documentation as necessary.

## Overview

SLIP allows the transmission of IP-encapsulated data over serial lines. PC-NFS SLIP software provides PC users with the same network services and applications available to them on an Ethernet.

SLIP network is different from an Ethernet. This chapter describes what you need to know before you start to set up a SLIP network. It covers the following topics:

- Connecting servers and clients to a SLIP network
- Direct SLIP connection information
- Dial-up SLIP connection information
- Providing information to SLIP users

## SLIP Networks and Connections

The Sun system on which you install the SLIP software can be a server already on a local network and running NFS or a standalone host that is not attached to a network. (For information on how to create a standalone host with NFS, refer to *System Administration* and *Network Programming* in your SunOS Docubox.)

PC-NFS SLIP software for SunOS includes all the kernel and utility programs needed to turn a Sun system running NFS into a SLIP gateway.

To prepare for SLIP network connections:

1. Allocate a network name and Internet address for the SLIP network. The SLIP network connects those PCs using SLIP with their gateway.
2. Within the SLIP network, allocate a name and Internet address for the Sun system to be used as the SLIP gateway.
3. For each PC to be connected to the SLIP network, allocate a name and Internet address.
4. Make sure that you have available a PC running PC-NFS on an Ethernet, or a Sun386i system to move the SLIP server software from the PC-NFS distribution diskettes to the Sun system you will use as the gateway.
5. Make sure that the Sun system to be used as the gateway has 1 megabyte or more free disk space to accommodate the distribution software.
6. Make sure that the Sun system to be used as the gateway has modems installed and configured correctly.

   For a Sun-2, Sun-3, or Sun-4 system see the chapter “Adding Hardware to Your Sun” in the SunOS Docubox. For a Sun 386i system, see Chapter 4 in the Owner’s Set book *System Setup and Maintenance*.

Figure 2-1 shows a sample network diagram. Any network traffic between SLIP PCs and systems on the "e-net" network passes through the gateway "slip-gate" and the server "mailhost."

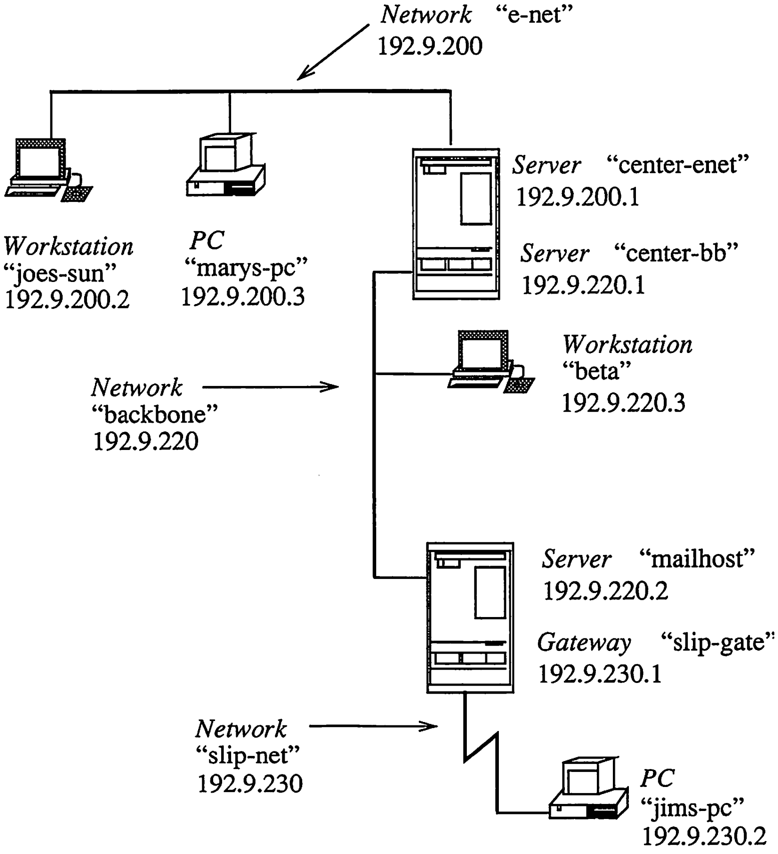


**Figure 2-1** *Sample Network Diagram*

The network diagram in Figure 2-1 has two Ethernet networks, “e-net” and “backbone.” When the SLIP network “slip-net” was planned:

- A network name and IP address were assigned to the SLIP network: slip-net and 192.9.230.
- The server “mailhost” was designated as the SLIP gateway. A name and IP address were assigned to this gateway: slip-gate and 192.9.230.1.
- A name and IP address were assigned to the PC on the SLIP network: jims-pc and 192.9.230.2.

### Routing

Routing is the process of determining how to transmit IP-encoded data from one machine to another machine. Routing is done by the `routed` program that runs on Sun servers. `Routed` builds tables that contain routing information, such as network names and Internet addresses, that the program uses to move data from its source to its destination.

In previous implementations of SLIP, you had to set up an `etc/gateways` file to describe the route to be taken to reach each SLIP network. This is no longer required; `routed` now handles all routing.

## Direct SLIP Connection Information

A direct SLIP connection consists of an RS-232 null modem cable connecting a PC to a server port. Like an Ethernet connection, it is a dedicated connection.

On the server side, you use the `slattach` command to bind the network connection to a particular serial port at a given speed.

At the PC, you make entries in the `CONFIG.SYS` file to bind the network connection to a particular serial port (COM1 or COM2) at a given speed.

## Dial-up SLIP Connection Information

A dial-up connection may be a shared resource. A number of SLIP clients (PCs) may be connected at different times through the same or different server ports. Note that you do not have to dedicate a serial port to SLIP users only; other users can continue to use the port to dial in.

In dial-up connections, you identify network connections by user (login) ID.

As network administrator, you determine:

- The number of simultaneous SLIP sessions
- Information PC users need to know to connect to the SLIP gateway, including the server telephone number, user IDs, and passwords

**Number of sessions.** You decide how many users can dial up at the same time to a particular server. This number should be greater than one, but not greater than the number of serial ports on the server, up to a maximum of eight (the number in the SLIP driver). For each session, you add a line to the `/etc/slip.config` file that contains the SLIP gateway name.

**Information for PC users.** For each PC, you add a line that contains the PC name and the user ID to the `/etc/slip.hosts` file on the SLIP server. If a user is to be allowed to dial into more than one server, you must enter the PC name and user ID in the `etc/slip.hosts` file on each SLIP server the user can access.

If you have many dial-up users and limited network addresses, you may share a single PC name and address among several users. However, note that only one user can use an address at a time.

PC users create one or more *profiles* to use SLIP connections. A profile contains the information necessary for a modem to dial and connect to a server, including the telephone number of the server and a user ID on the server.

**How the `connect`, `sunslip`, and `hangup` programs work.** The `sunslip` program on the server and the `connect` program on the PC work to establish the SLIP connection and start PC-NFS.

On the PC, `connect` reads the profile information, sets up the modem, dials the telephone number, logs in as a normal interactive user on the server, and starts `sunslip`. On the server, `sunslip` validates the user request, sends back network configuration information to the PC, and puts the line into SLIP mode. When the PC user issues the `hangup` command, the modem hangs up and breaks the connection. `Sunslip` then turns off SLIP mode and restores the line to its regular interactive mode.

## Providing Information to SLIP Users

PC users on SLIP networks may contact you for information or assistance.

Users who dial a server need the following information:

- The telephone number of the SLIP server
- A user ID (login ID) on the server
- A password on the server

When you set up the user IDs on the server, you may find it helpful to write down the information and keep it readily available to give to users.

Users who are directly connected to a server may need YP information, PC name and address information, and `pcnfsd` information.

Appendix A provides some guidelines for troubleshooting network problems.

# Installing SLIP on a Sun System

# 3

This chapter contains instructions to install and configure SLIP software on the following systems running these operating systems:

- A Sun-2, Sun-3, or Sun-4 running SunOS 3.x (version 3.2 or later)
- A Sun-2, Sun-3, Sun-4, or Sun386i running SunOS 4.x (version 4.0 or later)

## Overview

The SLIP gateway installation has two parts:

1. Installing the software, which includes unpacking a `tar` archive, running a shell script to generate a new SunOS kernel with SLIP support, and installing the kernel
2. Configuring the gateway for SLIP connections (direct, dial-up, or both)

### Before You Start

Please read through all of the information in this chapter, especially the section "SLIP Network Installation Example" before you begin the installation.

Before you start the SLIP gateway installation:

- Connect the SLIP gateway to another network by adding the SLIP network name and IP address to the YP network database if YP is used. If YP is not used, add the SLIP network name and address to the `/etc/networks` file on the server to be used as the gateway.
- Add the SLIP gateway and SLIP PC names and IP addresses to the YP database if YP is used. If YP is not used, add the names and addresses to the `/etc/hosts` file on the server to be used as the gateway.

- Confirm availability of either a PC with PC-NFS installed and running, or a Sun386i system to copy installation files from diskette to the SLIP server. You can copy the files from a PC connected to an accessible Ethernet or from the 3.5” diskette drive on a Sun386i.
- Confirm that the server has 1 megabyte or more free disk space to accommodate the distribution software to be copied from PC-NFS diskettes.

The software installation may take anywhere from about two minutes on a Sun-4 or Sun386i system to about seven minutes on a Sun-2 or Sun-3 system. The configuration time depends on a number of factors, such as whether you are configuring for direct or dial-up and how many connections you are adding.

## Installing SLIP on a Sun System Running SunOS 3.x

To install SLIP on a Sun-2, Sun-3, or Sun-4 System running SunOS 3.x:

1. On a PC running PC-NFS, which is on a network through which you can access the server, use `nfsconf` or `net use` to mount a writable directory on the server. For example:

   ```
   NET USE K: \\server\usr\tmp
   ```

   Then, copy the following two files from the PC-NFS “Server 2” diskette to that directory:

   For a Sun-2 or Sun-3 system, type:

   ```
   copy a:serial\makefile mounted drive
   copy a:serial\slipdist.tar mounted drive
   ```

   For a Sun-4 system, type:

   ```
   copy a:serial\makefile mounted drive
   copy a:serial\slipdst4.tar mounted drive
   ```

2. Log on to the server (either directly or by using `telnet`). Type **su** to become superuser. Go to the directory you copied the files to in step 1 and unpack the files:

   On a Sun-2 or Sun-3 system, type:

   ```
   make unpack
   ```

On a Sun-4 system, type:

```
make unpack4
```

This uncompresses the source file and uses the `tar` command to move all of the PC-NFS files into the directory `slipdist` on a Sun-2 or Sun-3 system, or into the directory `slipdst4` on a Sun-4 system.

3. Change to the `slipdist` directory (Sun-2 or Sun-3) or the `slipdst4` (Sun-4) directory. Run the interactive installation script by typing:

```
addslip.csh YOUR-CONFIG
```

where *YOUR-CONFIG* is the name of the configuration file you want to use to configure your system. For example, if the name of the configuration file is `DELTA`, type **`addslip.csh DELTA`**. To use the current configuration file, type **`addslip.csh`** without specifying a configuration file name and press [Enter].

Note: Configuration files are kept in `/usr/sys/conf`. The first line of the `/etc/motd` file includes the name of the current configuration file.

The installation script gives you the option of:

- Removing SLIP files (if any exist on your system)
- Installing SLIP
- Upgrading SLIP
- Finishing an incomplete installation

The installation procedure then:

- Checks the kernel configuration file and edits it, if necessary
- Copies SLIP source files to your system and backs up the current versions of those files
- Compiles and installs SLIP utilities
- Configures and builds the SLIP kernel

Before each operation, you can choose whether or not to complete it and continue.

The new kernel is put in the directory `/usr/sys/YOUR-CONFIG-SL`. For example, if your configuration file is `DELTA`, the new kernel is put in `/usr/sys/DELTA-SL`.

If you stop the script before SLIP is installed, simply run the installation again. Do not back up your system files more than once during installation, or you will lose the copies of your original files.

4. Copy the modified kernel to the root directory, and save a copy of the original kernel as follows:

```
cd /usr/sys/YOUR-CONFIG-SL
cp vmunix /vmunix.slip
cd /
mv vmunix vmunix.old
ln vmunix.slip vmunix
/etc/fastboot
```

   If the new kernel doesn't boot properly, you can revert to the previous version of `vmunix`. Halt the system, type **`boot vmunix.old`**, log in as root, and type **`mv /vmunix.old /vmunix`**.

The SLIP software is now installed on your Sun system. To verify that the installation is correct, see the section "Verifying a New SLIP Installation." Then, to configure the Sun system for direct or dial-up connections, see the sections "Configuring a Sun System for Direct Connections" or "Configuring a Sun System for Dial-up Connections" in this chapter.

If you ever reconfigure your kernel, you should base your new configuration on the file *`YOUR-CONFIG-`*`SL` to make sure that your configuration includes SLIP.

## Installing SLIP on a Sun System Running SunOS 4.x

To install SLIP on a Sun-2, Sun-3, Sun-4, or Sun386i system running SunOS 4.x:

1. On a PC running PC-NFS, which is on a network through which you can access the server, use `nfsconf` or `net use` to mount a writable directory on the server. For example:

```
NET USE K: \\server\usr\tmp
```

   Then, copy the following two files from the PC-NFS "Server 2" diskette to that directory:

```
copy a:serial\makefile mounted drive
copy a:serial\slipd40.tar mounted drive
```

Note: For a Sun386i system, if you use 3.5" diskettes, you can copy the files directly from the DOS diskette to a UNIX directory by using a DOS Window™.

2. Log on to the server (either directly or by using `telnet`). Type **`su`** to become superuser. Go to the directory you copied the files to in step 1 and type:

   ```
   make unpack40
   ```

   This uncompresses the source file and uses the `tar` command to move all of the PC-NFS files into the directory `slipd40`.

3. Change to the `slipd40` directory. Run the interactive installation script by typing:

   ```
   addslip.csh YOUR-CONFIG
   ```

   where *YOUR-CONFIG* is the name of the configuration file you want to use to configure your system. For example, if the name of the configuration file is `DELTA`, type **`addslip.csh DELTA`**. To use the current configuration file, type **`addslip.csh`** without specifying a configuration file name and press Enter.

   Note: Configuration files are kept in `/usr/sys/conf`. The first line of the `/etc/motd` file includes the name of the current configuration file.

   The installation script gives you the option of:

   - Removing SLIP files (if any exist on your system)
   - Installing SLIP
   - Upgrading SLIP
   - Finishing an incomplete installation

   The installation procedure then:

   - Checks the kernel configuration file and edits it, if necessary
   - Copies SLIP source files to your system and backs up the current versions of those files
   - Compiles and installs SLIP utilities
   - Configures and builds the SLIP kernel

   Before each operation, you can choose whether or not to complete it and continue.

The new kernel is put in the directory `/usr/sys/'arch'/`*`YOUR-CONFIG`*`-SL`, where `'arch'` is the type of Sun system you are using (Sun2, Sun3, Sun4, or Sun386i). For example, if you are using a Sun-4 system and your configuration file is `DELTA`, the new kernel is put in `/usr/sys/sun4/DELTA-SL`.

If you stop the script before SLIP is installed, simply run the installation again. Do not back up your system files more than once during installation, or you will lose the copies of your original files.

4. Copy the modified kernel to the root directory, and save a copy of the original kernel as follows:

```
cd /usr/sys/'arch'/YOUR-CONFIG-SL
cp vmunix /vmunix.slip
cd /
mv vmunix vmunix.old
ln vmunix.slip  vmunix
/etc/fastboot
```

If the new kernel doesn't boot properly, you can revert to the previous version of `vmunix`. Halt the system, type **`boot vmunix.old`**, log in as root, and type **`mv /vmunix.old /vmunix`**.

The SLIP software is now installed on your Sun system. To verify that the installation is correct, see the section "Verifying a New SLIP Installation." Then, to configure the Sun system for direct or dial-up connections, see the sections "Configuring a Sun System for Direct Connections" or "Configuring a Sun System for Dial-up Connections" in this chapter. To remove a SLIP installation, see the section "Removing a SLIP Installation."

If you ever reconfigure your kernel, you should base your new configuration on the file *`YOUR-CONFIG`*`-SL` to make sure that your configuration includes SLIP.

## Verifying a New SLIP Installation

Once you have built a kernel containing SLIP support, check to see if it is working correctly as a SLIP server before you connect a PC to it.

To verify a new SLIP installation on a Sun system:

1. Log in as superuser.
2. Pick an available serial port and, if necessary, disconnect any device attached to that port.

   If a device was attached to the port, disable logins on the port.

   - For SunOS 4.0, edit `/etc/ttytab` and mark the line for your tty device "off."
   - For SunOS 3.x, edit `/etc/ttys` and change the first character on the line for your tty device to a 0.
3. Type **`kill -1#`** to make the login change effective (where # is the process ID associated with the `slattach` process).
4. Pick an unused pair of IP addresses on an unused network and enter the addresses in your hosts database.
5. Type:

   ```
   /etc/slattach ttyn hostaddress pcaddress
   baudrate &
   ```

   For example, if you use `ttyb`, the host address is 192.9.254.1, the PC address is 192.9.254.2, and the baud rate is 9600, type:

   ```
   /etc/slattach ttyb 192.9.254.1 192.9.254.2 9600 &
   ```

   or, if you don't know the host and PC IP addresses, type:

   ```
   /etc/slattach ttyb hostname pcname 9600 &
   ```

   For direct connections, always use a 9600 baud rate (the default).
6. Type **`ping`** ***pcaddress***. After this times out, you should see the message: `No answer from` *address*. For example, if you type **`ping 192.9.254.2`**, you see the message: `No answer from 192.9.254.2`.
7. Type **`netstat -i`**. The SLIP network interface `sl0` should be displayed, along with statistics. Packets should have been sent out over that interface, but no packets received. (Note: you may see one or more `Ierrs` due to line noise.)

8. Kill the `slattach` process. To do this, obtain the process number by typing **`ps -ax`**; then type **`kill -1#`**.
9. Reenable logins on the port.

## Removing a SLIP Installation

To remove a SLIP installation, run the `addslip.csh` installation script as described previously in “Installing SLIP on a Sun System Running 3.x” or “Installing SLIP on a Sun System Running 4.x.” Select the option to remove SLIP files. After you complete the procedure, restore your non-SLIP kernel by doing the following:

- Halt the system
- Type **`boot vmunix.old`**
- Log in as root, and type **`mv /vmunix.old /vmunix`**

## Configuring a Sun System for Direct Connections

After you install the SLIP gateway software, you can configure the gateway for direct connections.

For direct connections, you use the `slattach` command to bind a network connection to a particular serial port at a given speed.

Before you start the configuration, for each tty line to be used for a SLIP client, disable logins on the port:

1. For SunOS 4.0, edit `/etc/ttytab` and mark the line for your tty device “off.”

   For SunOS 3.x, edit `/etc/ttys` and change the first character on the line for your tty device to a 0.
2. For both SunOS 3.x and SunOS 4.0, type **`kill -1#`** to make the login change effective.

To configure a Sun system for direct SLIP connections:

1. Modify the `/etc/rc.local` file by adding a line with the following format before the command to start `routed`:

   ```
   /etc/slattach ttynn gateway-name client-name
   speed &
   ```

   For example, to attach PC "jims-pc" to `/dev/tty04` on server "slip-gate" at 9600 baud, type:

   ```
   /etc/slattach tty04 slip-gate jims-pc 9600 &
   ```

2. Check that the cables to the SLIP PC are correctly attached to the serial port that you will use.

3. Either reboot the system or execute the commands you added to `/etc/rc.local`.

The gateway is now ready. A sample network installation is provided in the section "SLIP Network Installation Example."

## Configuring a Sun System for Dial-up Connections

After you install the SLIP gateway software, you can configure the gateway for dial-up connections.

Dial-up connections can be a shared resource. Several SLIP clients can connect to a server using the same serial connection. Note that a port can be used by only one client at a time. You control which SLIP clients are allowed to log in to a server by listing them in a file. When a SLIP user connects and logs in, the PC name and user ID are validated against this table. You can keep track of which SLIP connections are active, and you also control the number of simultaneous SLIP sessions.

You do this by modifying (first creating, if any do not exist) four files:

| File name | What you add |
|---|---|
| `/etc/rc.local` | 3 lines to prepare for dial-up SLIP usage |
| `/etc/slip.config` | Gateway name for number of SLIP sessions |
| `/etc/slip.hosts` | Client (PC) name and user (login) ID |
| `/etc/ttytab` (SunOS 4.x)<br>or `/etc/ttys` (SunOS 3.x) | Baud rate equal to PC baud rate |

The following procedures describe these modifications in more detail.

To configure a Sun system for dial-up SLIP connections:

1. Confirm that the modems are installed and configured correctly on your Sun system.
2. Add the following lines to the end of the `/etc/rc.local` file:

```
if [-f /etc/slip.config -a -f /etc/mkslipuser];
   then /etc/mkslipuser; (echo "Resetting SLIP
   user table")    >/dev/console
fi
```

   This prepares the server for dial-up SLIP usage.

3. For each dial-up session, add a line containing the gateway name to the `/etc/slip.config` file. This number should be less than eight but greater than one. For example, to allow four simultaneous sessions on a gateway called “slip-gate,” you add the following lines to the `/etc/slip.config` file:

```
slip-gate
slip-gate
slip-gate
slip-gate
```

4. For each user, add a line to the `/etc/slip.hosts` file that contains the client (PC) name and the user (login) ID. For example, if your SLIP PC names are “jims-pc” and “gamma” and your user IDs are user1, user2, user3, add these lines in the `/etc/slip.hosts` file:

```
jims-pc user1
gamma user2
gamma user3
```

   In this example, user2 and user3 share the PC name “gamma,” so that only one of them can run SLIP at a time.

   If a user is to be allowed to dial into more than one gateway, that user needs a user ID on each server to be accessed.

5. Make sure that logins are enabled and the baud rate is set correctly on each `tty` line by editing `/etc/ttytab` (SunOS 4.x) or `/etc/ttys` (SunOS 3.x).

6. Either reboot the system or run the program `/etc/mkslipuser`. This sets up the file `/etc/slip.user`. This file records the state of all dial-up slip sessions. Use the command `/etc/dslipuser` to display this information.

The gateway is now ready. A sample network installation is provided in the section “SLIP Network Installation Example.”

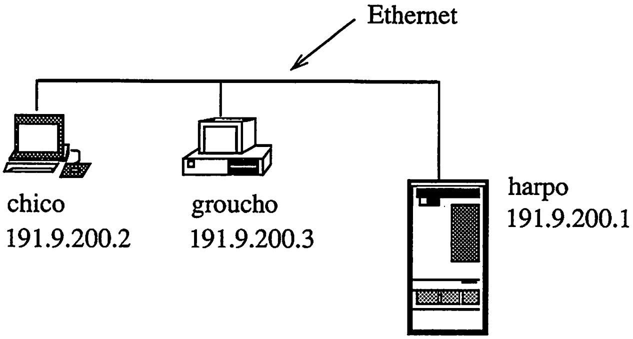
## SLIP Network Installation Example

This section provides an example of how to set up a SLIP network, including both gateway and PC installation. It is intended for illustrative purposes only. When you install the serial software, use Chapters 2, 3, and 4 for the actual installation, verification, and configuration instructions.

This example uses a network consisting of a single Ethernet. Attached to this network are three machines:

- `harpo` (191.9.200.1), a Sun 3/280 with an ALM-2 running SunOS 4.0
- `chico` (191.9.200.2), a Sun 4/110 running Sun OS4.0.1; the Yellow Pages master for the domain `marx.com`
- `groucho` (191.9.200.3), an IBM® PC AT™ running PC-NFS 3.0.1 and DOS 4.0

The network looks like this:



All of the ports on the ALM-2 are connected via a patch panel and twisted pairs to individual offices, where they are used for timesharing with dumb terminals.

Two of these users want to replace their terminals with networked PCs; however, there are no Ethernet taps nearby. The solution is to use PC-NFS with SLIP over the existing wiring.

In addition, three other members of the staff want to dial in from their PCs at home. To support this, a modem was installed on the `harpo` `ttyb` port and each PC was equipped with an internal modem. However, timesharing access using terminal emulation software on the PCs is unsatisfactory: the users want to use the full range of network services, such as file transfer, remote login, and mail. To accomplish this, these PCs will be upgraded with PC-NFS and dial-up SLIP.

To set up this network:

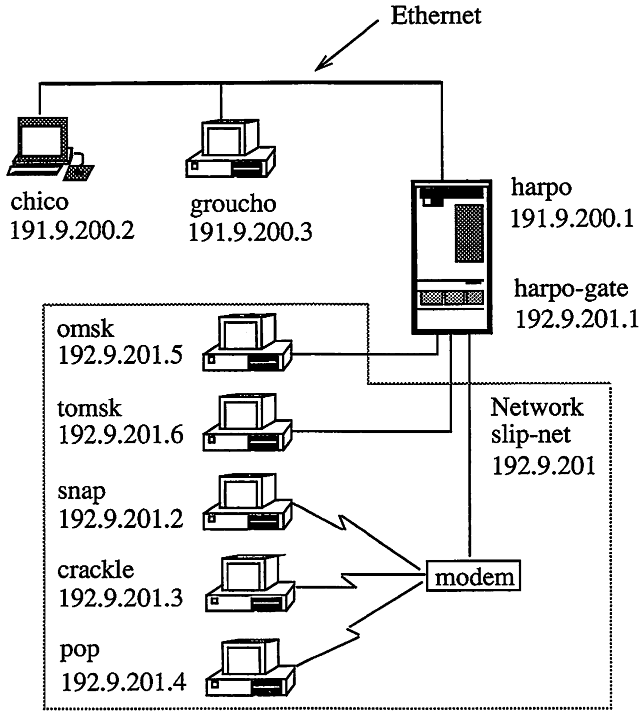
1. **Plan the network.**

   Since the `harpo` system provides all the serial ports via its ALM, all SLIP connections will be made to `harpo`. Harpo will be the server providing the SLIP gateway to the ethernet. Therefore, you can use a single SLIP network name and number. You select `slip-net` and 192.9.201, and you assign these names and addresses:

| | | |
|---|---|---|
| `harpo-gate` | `192.9.201.1` | harpo's identity on SLIP network |
| `snap` | `192.9.201.2` | a dial-up PC used by jsmith |
| `crackle` | `192.9.201.3` | a dial-up PC used by cbrown |
| `pop` | `192.9.201.4` | a dial-up PC used by lbird |
| `omsk` | `192.9.201.5` | a direct-connect PC |
| `tomsk` | `191.9.201.6` | a direct-connect PC |

   You add these names to the `/etc/hosts` file on `chico` (the YP master) and use `yppush` to "push" the Yellow Pages maps.

   The network now looks like this:



2. **Install SLIP software on the gateway.**

Before you can do the actual gateway installation, you transfer the software from the PC-NFS distribution diskettes to the chosen server system, `harpo`. Boot up the PC `groucho` and run `nfsconf`. Using `Display mounted resources`, verify that drive K is not in use; then with `Mount`, mount `harpo`'s `/usr/tmp` on drive K.

Insert the "Server 2" diskette in drive A and type:

```
copy a:serial\makefile k:
copy a:serial\slipd40.tar k:
```

Now, log in to `harpo` (perhaps via telnet from `groucho`) as superuser and unpack the distribution kit by typing:

```
cd /usr/tmp
make unpack40
cd slipd40
```

Check the directory `/usr/sys/'arch'/conf` to verify that the last time you rebuilt the kernel, you used the configuration file `HARPO2`.

Now you can build SLIP by typing:

```
addslip.csh HARPO2
```

This copies all of the source files to the correct directories, modifies certain configuration files, and sets up a new SunOS kernel configuration file called `HARPO2-SL`. The kernel is built, but not installed. Finally, the programs that allow you to establish connections are built and installed. Assuming these procedures are completed without error, you can install and start the new SunOS kernel:

```
cd /usr/sys/Sun3/HARPO2-SL
cp vmunix /vmunix.slip
cd /
mv vmunix vmunix.old
ln vmunix.slip vmunix
/etc/fastboot
```

3. **Verify the new installation.**

Log in to `harpo` as superuser. Disable logins on `ttyb` by editing `/etc/ttytab` and then typing:

```
kill -1 1
```

This ensures that `getty` accepts the new configuration. Unplug the modem on `ttyb`. Type:

```
/etc/slattach ttyb harpo-gate pop 9600 &
```

Then type:

```
/usr/etc/ping pop
```

This will time out. Then type:

```
/usr/etc/netstat -i
```

This verifies that device `sl0` is present and that packets have been sent out. If everything looks good, kill the `slattach` process and restore the tty port to its original state.

4. **Configure the hard-wired connections.**

Now you're ready to configure the hard-wired connections. It's generally a good idea to do this before configuring the dial-up connections; the hard-wired setup is simpler than dial-up, and it lets you check the SLIP operation before getting into modem configurations.

The PC `omsk` is connected via its COM1 port to the ALM-2 port corresponding to `/dev/ttyh3`; similarly, `tomsk` is connected via COM1 to `/dev/ttyh7`. Start by setting up the gateway configuration. Log in to `harpo` as superuser and disable logins on these ports. Then add the following lines to `/etc/rc.local`:

```
/etc/slattach ttyh3 harpo-gate omsk 9600 &
/etc/slattach ttyh7 harpo-gate tomsk 9600 &
```

Now reboot or run the commands by hand. In either case, running `netstat -i` should show two lines for `sl0` and `sl1`.

5. **Configure the hard-wired PCs.**

Having completed the gateway configuration, you're ready to set up PC-NFS on `omsk` and `tomsk`. Install PC-NFS for a SLIP connection as described in Chapter 4 of this guide, selecting `Serial`, `Direct`, `COM-port 1`, and `9600 baud`. When the `Network - Direct Connection` screen is displayed, select `Yellow Pages` and YP domain `marx.com`. You have to go to the `Advanced Questions` screen to set the name and address of the YP server; since this is a point-to-point link, PC-NFS can't broadcast to find a server, so you must identify `chico` explicitly. When you're finished, reboot the PC and watch the messages displayed by PC-NFS. If all is well, you should be able to use all of the PC-NFS facilities described in the *PC-NFS User's Manual.*

If the SLIP link is not working correctly, the first error you'll see is the message:

```
NFS025F: chico is not a YP server …
NFS026I: Searching for a YP server …
```

Since no YP server will be found, interrupt the startup sequence by typing Ctrl Break several times. Next, check to see if packets are getting through. By running `netstat -i` on both the PC and the gateway (`harpo`), you can inspect the `Ipkts` and `Opkts` for `sl0`. If both values are non-zero on both systems, it is likely that SLIP itself is working and that the problem lies elsewhere. In any case, refer to Appendix A, "Troubleshooting," later in this book.

## 6. Configure the dial-up connections.

The last step is setting up the dial-up systems. First, you create the databases that control the dial-up SLIP gateway. Then, you can install PC-NFS on each PC and check the configuration by dialing in.

If the files `/etc/slip.config` or `/etc/slip.hosts` do not exist, create them.

Edit the file `/etc/slip.config` to contain the following lines:

```
harpo-gate
harpo-gate
harpo-gate
harpo-gate
```

This specifies that up to four dial-up sessions can be supported, and that for each one the gateway is to be `harpo-gate`. Note that the file must include at least two entries for backward compatibility reasons, and that the total number of possible dial-up and hard-wired connections should not exceed the number of serial ports. (The default is 8; using a higher number is not recommended.)

Now you identify the users who can use dial-up SLIP. Edit the file `/etc/slip.hosts` and add these lines:

```
snap       jsmith
crackle    cbrown
pop        lbird
```

Taken together, these two files say "if user `cbrown` dials up and tries to enter SLIP mode, set up the serial line as a SLIP link between `harpo-gate` and `crackle`."

To keep track of which SLIP users have logged in and which names are in use, SLIP uses the file `/etc/slip.user`. (You can inspect the current dial-up SLIP connections with the program `dslipuser`.) To make sure that this database is re-initialized every time `harpo` is rebooted, edit the file `/etc/rc.local` and add the lines:

```
if [-f /etc/slip.config -a -f /etc/mkslipuser];
   then/etc/mkslipuser; (echo "Resetting SLIP
   user table") >/dev/console
fi
```

To make sure everything is ready for the first dial-in:

- Make sure that logins are enabled on the port to which the modem is attached by checking the `/etc/ttytab` file.
- Modify the `.login` file of each potential dial-up user (`jsmith`, `cbrown`, `lbird`), to use a prompt ending in `%`.

7. **Configure the dial-up PCs.**

Now you can set up the PCs. The system used by `jsmith`, `snap`, has a Hayes 2400 baud internal modem configured as COM2. Install PC-NFS as described in Chapter 4 of this guide, specifying `Serial`, `Dial-up`, `COMport 2`, and `2400 baud`. Select `Networks` and `Dial-up`, and set up a profile with the name `harpo`, including the correct phone number and the user ID `jsmith`.

Now reboot the PC (note that PC-NFS is not started automatically in this mode), and type:

```
connect harpo
```

If everything works correctly, the PC displays a series of messages, ending with `PC-NFS Installed`. To verify that SLIP is working, type:

```
telnet harpo-gate
```

If this does not work, the first step in troubleshooting is to reboot the PC and type:

```
connect -d harpo
```

This shows you the complete dialog in the connection process.

The reason to telnet to `harpo-gate` rather than `harpo` or `chico` is that you don't have access yet to the Yellow Pages and hence to the hostname map. To correct this, create a file `\NFS\HARPO-YP.BAT` and edit it to contain the following lines:

```
net ypdomain marx.com
net ypset chico
net name jsmith *
```

Edit `\NFS\HOSTS` and add the line

```
192.9.200.2      chico
```

This ensures that the rest of the systems can be found via YP once the YP server has been reached.

You can either run `harpo-yp` after `connect harpo`, or you can set up a profile using `nfsconf` and specifying that this file should be run as the start-up batch file.

# Installing and Using SLIP on Your PC

# 4

SLIP allows you to use PC-NFS over serial lines, either by direct cable or by dialing up your server from a remote location over a modem and telephone line.

This chapter describes how to install and use SLIP on your PC.

It begins with a section describing equipment and information you'll need to install SLIP. It then gives you procedures for installing and using a direct connection or a dial-up connection. The last section in this chapter describes switching from serial to nonserial (Ethernet) operations and back.

If you have any direct or dial-up SLIP questions that this chapter doesn't cover, see Appendix A, "Troubleshooting," for help. If you want to review the complete SLIP installation process (including both server and PC), see the section "SLIP Network Installation Example" at the end of Chapter 3.

## Before You Start

Please read Chapter 1, "What Is SLIP?" before you do your first installation.

To install SLIP, you:

- Connect serial communications equipment to your PC
- Install PC-NFS from diskettes
- Enter information into the PC-NFS program `nfsconf`

You need the PC-NFS distribution diskettes, and you may want to refer to the manual *Installing PC-NFS, A Guide to the User and System Administrator*. The information that PC-NFS asks you for and the equipment you need are listed in the following pages. *Ask your network administrator to provide you with all the necessary information.*

For a direct connection, you need the following equipment and related information:

- A serial communications port on your PC

  Most PCs have one serial port, identified as COM1. Some PCs may be equipped with two or more; these ports may be configured as COM2, COM3, and so on. PC-NFS SLIP can only use COM1 or COM2. Check the documentation supplied with your PC or serial card for details.

- A null modem cable

  A null modem cable allows communication between two serial devices without using a modem, and is used to connect your PC to its server.

  Most Sun system serial ports have a 25-pin adapter; most PC serial ports have a 9-pin adapter. This means that you have to match the correct pin 1 on the PC adapter to the correct pin on the server cable. To do this, you use a null modem cable. The *pin-out* for this unique 9-pin to 25-pin connection is:

  2 to 2

  3 to 3

  5 to 7

  6 to 20

  8 to 20

  For best performance, the cable should not be longer than 100 feet. You should ensure that electromagnetic interference on the line is minimized by routing the cable away from heavy electrical equipment and by using shielded cable. The cable must comply with FCC emissions requirements, and this will automatically provide a high degree of noise immunity.

- The baud rate of the serial link

  The baud rate defines the speed at which data moves over the serial line. PC-NFS can operate over serial lines at speeds of 1200, 2400, 4800, and 9600 baud. The default for a direct connect is 9600, which will give you the best performance.

- Direct connection information, as shown in Table 4-1

**Table 4-1** *Information for a Direct Connection*

| Information | Explanation |
|---|---|
| Time zone | The time zone for the area where you live |
| Daylight savings time | Whether the area where you live observes daylight savings time |
| Yellow Pages | Whether you use Yellow Pages, a database that contains information such as host names, Internet addresses, and Ethernet addresses |
| PC name | The name of your PC on the network |
| IP address of PC | The Internet address of your PC |
| Gateway name | The name of the gateway on the SLIP network your PC connects to |
| IP address of gateway | The Internet address of the gateway |
| *If you use Yellow Pages, you also enter this information:* | |
| Yellow Pages domain name | The name of a group of systems and users in the Yellow Pages database |
| YP server name | The name of the Yellow Pages server |
| IP address of YP server | The Internet address of the YP server |
| *If you do not use Yellow Pages, you also enter this information:* | |
| PCNFSD server name | The name of the PCNFSD server, which is where the software supporting PC-NFS resides |
| IP address of PCNFSD server | The Internet address of the PCNFSD server |

For a dial-up connection, you need the following equipment and related information:

- A serial communications port on your PC

  Most PCs have one serial port, identified as COM1. Some PCs may be equipped with two or more; these ports may be configured as COM2, COM3, and so on. PC-NFS SLIP works only on COM1 or COM2. Check the documentation supplied with your PC or serial card for details.

- A telephone line

- A modem

  The modem can be internal or external to your PC. Following is a list of modems supported by PC-NFS:

  - Hayes modems and 100% compatibles
  - NEC® laptop internal modem
  - Telebit TrailBlazer™ (internal and external) modem
  - Toshiba T1000® internal modem
  - USRobotics external Courier 2400™ modem
  - USRobotics internal Microlink 2400™ modem

  Note: To use NFS file sharing over a dial-up link, you must use an error-correcting modem. If your modem runs at less that 9600 baud, NFS file sharing is automatically disabled.

  Read the manufacturer's instructions carefully to make sure you choose the correct modem settings.

- The baud rate

  The baud rate defines the speed at which data moves over the serial line. PC-NFS can operate over serial lines at speeds of 1200, 2400, 4800, and 9600 baud. Use the maximum baud rate supported by the modem you are using. You can find baud rate information in the modem's documentation.

- Dial-up connection *profile* information and password on the server

  When you use the `nfsconf` program to configure a dial-up SLIP connection, a configuration screen is displayed in which you enter the information shown in Table 4-2. This information is called the *profile* of the dial-up connection. You can define as many profiles as you want, each defining a specific connection. You identify each profile with a unique name. For example, if you are allowed to dial in to more than one server, you set up a profile for each telephone number you can dial to. Ask your network administrator to provide you with any information you need to complete your profile.

  You also a password for each user ID you have on the server. If you do not know your password(s), contact your network administrator.

**Table 4-2** *Profile Information for a Dial-up Connection*

| **Information** | **Explanation** |
|---|---|
| Profile | The name you want to give to this profile. If you dial more than one server, using a server's name as the profile name can help you remember which server is which. The profile name can be one to 32 characters long. |
| Phone number | The telephone number to dial. If you need to dial a number to reach an outside line, enter that number followed by a comma. For example: 9, 239-1224 |
| Userid | Your user (login) ID on the server. |
| Timeout | The time in seconds before PC-NFS stops trying to connect to the server. The default is 60 seconds. |
| Start-up batch file | The name of the batch program you want executed on your PC after you establish a SLIP connection with the server. For example, if you want to receive mail via PC-NFS LifeLine, enter the name of a `.bat` file containing the line **`recvmail.exe`**. This is an optional field; to use it, enter the batch file name in place of the asterisk. |

## Direct Connection Installation

After reviewing "Before You Start" in this chapter, you are ready to start installing PC-NFS and SLIP for a direct connection.

If you are using a diskette-only PC, you need to prepare a bootable DOS diskette before you run the PC-NFS installation program. See "Creating a Bootable DOS Diskette for Diskette-only Installation" at the end of this chapter.

Note that if you have already installed PC-NFS on your PC, type **`nfsconf`**, press Enter, and start at step 10 in this procedure.

Remember that you can press F1 if you need help at any time when you are running the installation program or `nfsconf`.

To install a SLIP direct connection:

1. Insert the PC-NFS "Installation" diskette into your diskette drive. At the DOS prompt, type **`A:`** and press Enter.
2. Type **`install`** and press Enter. The PC-NFS copyright screen is displayed.
3. Press M to select a monochrome display or C to select a color display.
4. On the next screen, enter the letter of the drive where you want to install PC-NFS. You cannot install onto the same drive from which you are running the installation program.

   Note: If you already have a version of PC-NFS installed, a screen may be displayed with the question: `Do you wish to do an upgrade? (Y/N)`. If you answer `N`, your diskettes will receive a new serial number; if you answer `Y`, your diskettes will retain their current serial number.
5. On the next screen, use the arrow key and select `Serial`. The next screen asks you to select the type of serial configuration. Select `Direct`.
6. On the next screen, enter the COM port number (1 or 2) and the baud rate.
7. Choose `Y` to accept or `N` to reject the configuration you completed.

   If you choose `Y`, you have a last chance to change your mind: press Enter and continue with the next step or press Home to return to step 4. If you choose `N`, you return to step 4.

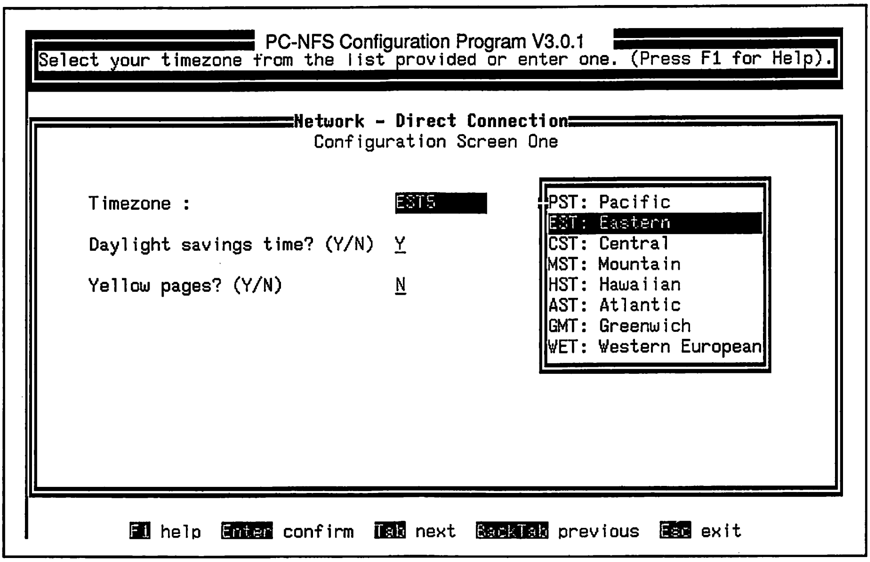
8. Insert the distribution diskettes as prompted, following instructions by the PC-NFS installation program. After you successfully load the distribution diskettes, PC-NFS is installed.

9. Press [Enter] to continue or press [Esc] to exit to DOS.

   If you press [Enter], you continue with the next step and start the `nfsconf` program to configure PC-NFS. If you press [Esc], you exit to DOS; if you do exit to DOS, note that your environment is in an inconsistent state, and that you should run `nfsconf` and reboot as soon as possible.

10. Select `Direct connect` on the Networks menu.

11. Configuration Screen One is displayed:



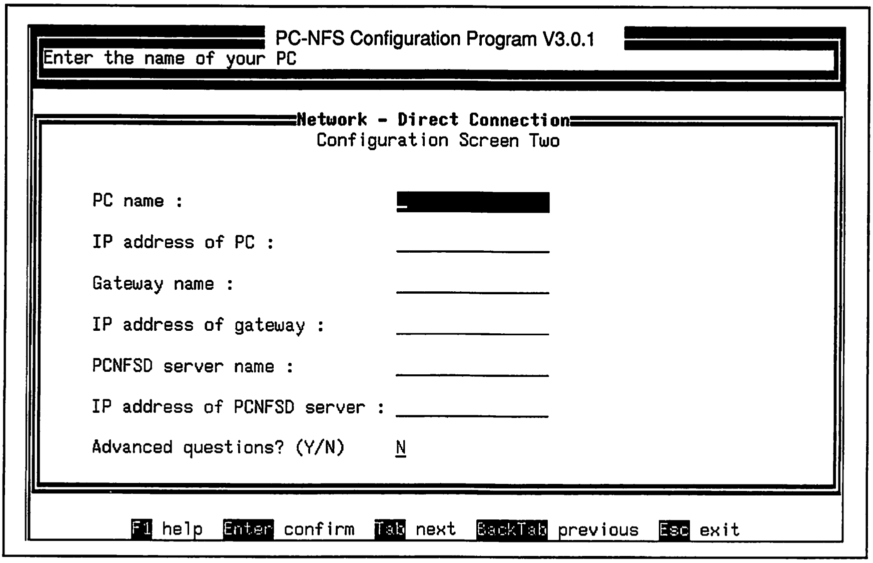
```
                      PC-NFS Configuration Program V3.0.1
Select your timezone from the list provided or enter one. (Press F1 for Help).

                       Network - Direct Connection
                        Configuration Screen One

    Timezone :                      EST5          PST: Pacific
                                                  EST: Eastern
    Daylight savings time? (Y/N)    Y             CST: Central
                                                  MST: Mountain
    Yellow pages? (Y/N)             N             HST: Hawaiian
                                                  AST: Atlantic
                                                  GMT: Greenwich
                                                  WET: Western European

        F1 help  Enter confirm  Tab next  BackTab previous  Esc exit
```

Enter the Time zone, Daylight savings time, and Yellow Pages information on the screen. If you answer `Y` to `Yellow Pages?` go to step 12; if you answer `N` to `Yellow pages?` go to step 13.

12. Configuration Screen Two is displayed.

    Enter the PC name, IP address of PC, Yellow Pages domain name, YP server name, and IP address of YP server. If you choose to answer the Advanced questions (optional), refer to Chapter 2 of *Installing PC-NFS, A Guide to the User and System Administrator.* Go to step 14.

13. Configuration Screen Two is displayed:



```
PC-NFS Configuration Program V3.0.1
Enter the name of your PC

Network - Direct Connection
Configuration Screen Two

PC name :
IP address of PC :
Gateway name :
IP address of gateway :
PCNFSD server name :
IP address of PCNFSD server :
Advanced questions? (Y/N)        N
```

    Enter the PC name, IP address of PC, PCNFSD server name, and IP address of PCNFSD server. If you choose to answer the Advanced questions (optional), refer to Chapter 2 of *Installing PC-NFS, A Guide to the User and System Administrator.* Go to the next step.

14. Choose `Y` to accept or `N` to reject the configuration.

    If you choose `Y`, continue with the next step. If you choose `N`, you return to step 11.

15. The Resources menu is displayed. Continue with the network configuration described in Chapter 2 of *Installing PC-NFS, A Guide to the User and System Administrator.*

16. Take out any PC-NFS diskettes. Reboot the PC (if you're using a diskette-only system, you must insert your boot diskette).

You can verify that the correct SLIP device driver is loaded by checking the DOS `CONFIG.SYS` file. The `CONFIG.SYS` file contains a list of device drivers that are loaded when the PC boots. `nfsconf` removes the line for an Ethernet driver (if any) and adds one for the SLIP driver. At the `C>` prompt, type **`type config.sys`**, and look for a line in the file similar to:

```
DEVICE=C:\NFS\SLIP.SYS /p1 /b9600
```

where `/p` specifies the COM port number and `/b` specifies the baud rate you chose during installation.

In addition, the line that identifies the `PCNFS.SYS` driver will have a `/x` switch appended to it.

You can now directly connect to your server using SLIP.

## Using SLIP over a Direct Connection

Once your SLIP direct connection software is installed, and your network administrator has configured a Sun system as a SLIP gateway, you can connect to your server and run PC-NFS.

To connect to a server:

1. Connect the null modem cable to the serial port on your PC. (The other end should already be connected to the Sun server.)
2. Boot your PC to start PC-NFS.

## Dial-up Connection Installation

After reviewing "Before You Start" in this chapter, you are ready to start installing PC-NFS and SLIP for a dial-up connection.

If you are using a diskette-only PC, you need to prepare a bootable DOS diskette before you run the PC-NFS installation program. See "Creating a Bootable DOS Diskette for Diskette-only Installation" at the end of this chapter.

Note that if you have already installed PC-NFS on your PC, type **`nsconf`**, press Enter, and start at step 10 in this procedure.

Remember that you can press F1 if you need help at any time when you are running the installation program or `nfsconf`.

To install a SLIP dial-up connection:

1. Insert the PC-NFS "Installation" diskette in your diskette drive. At the DOS prompt, type **`A:`** and press Enter.
2. Type **`install`** and press Enter. The PC-NFS copyright screen is displayed.
3. Press M to select a monochrome display or C to select a color display.
4. On the next screen, enter the letter of the drive where you want to install PC-NFS. You cannot install onto the same drive from which you are running the installation program.

   Note: If you already have a version of PC-NFS installed, a screen may be displayed with the question: `Do you wish to do an upgrade? (Y/N)`. If you answer `N`, your diskettes will receive a new serial number; if you answer `Y`, your diskettes will retain their current serial number.

5. On the next screen, use the arrow key and select `Serial`. The next screen asks you to select the type of serial configuration. Select `Dial-up`.
6. On the next screen, enter the COM port number (1 or 2) and the baud rate.
7. Choose `Y` to accept or `N` to reject the configuration you completed.

   If you choose `Y`, you have a last chance to change your mind: press Enter and continue with the next step or press Home to return to step 4. If you choose `N`, you return to step 4.

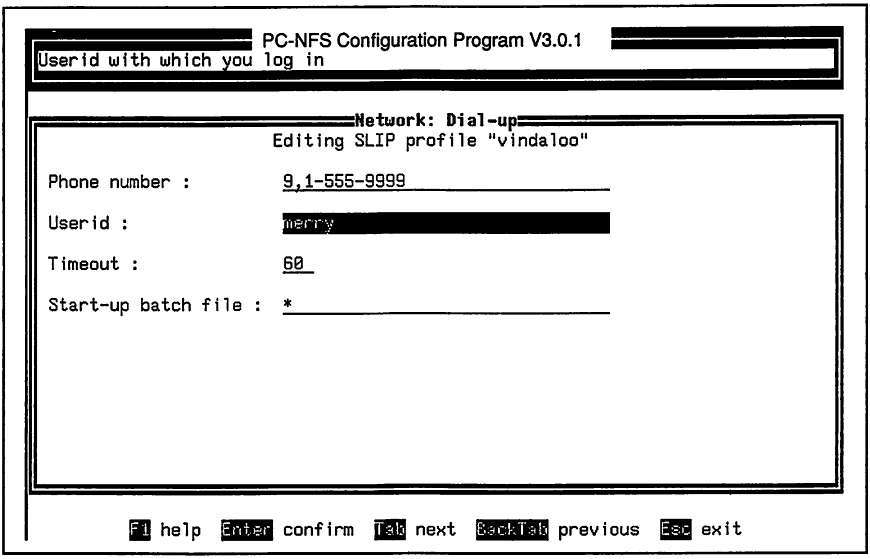
8. Insert the distribution diskettes as prompted, following instructions in the PC-NFS installation program. After you successfully load the distribution diskettes, PC-NFS is installed.

9. Press Enter to continue or press Esc to exit to DOS.

   If you press Enter, you continue with the next step and start the `nfsconf` program to configure PC-NFS. If you press Esc, you exit to DOS; if you do exit to DOS, note that your environment is in an inconsistent state, and that you should run `nfsconf` and reboot as soon as possible.

10. Select `Dial-up` on the Networks menu.

11. On the next screen, enter the dial-up connection profile name. The following screen is displayed.



```
PC-NFS Configuration Program V3.0.1
Userid with which you log in

Network: Dial-up
Editing SLIP profile "vindaloo"

Phone number :            9,1-555-9999

Userid :                  merry

Timeout :                 60

Start-up batch file :     *

F1 help   Enter confirm   Tab next   BackTab previous   Esc exit
```

   Enter the Phone number, Userid, and Timeout; the Start-up batch file name is an optional entry.

12. Choose `Y` to accept or `N` to reject the configuration.

   If you choose `Y`, continue with the next step. If you choose `N`, you return to the previous step.

13. The Resources menu is displayed. Continue with the network configuration described in Chapter 2 of *Installing PC-NFS, A Guide to the User and System Administrator*.

14. Take out any PC-NFS diskettes. Reboot the PC (if you're using a diskette-only system, you must insert your boot diskette).

You can change an existing dial-up profile by selecting the Networks menu, then selecting `Dial-up`, and then selecting the system name you want to change.

You can verify that the correct SLIP device driver is loaded by checking the DOS `CONFIG.SYS` file. The `CONFIG.SYS` file contains a list of device drivers that are loaded when the PC boots. `nfsconf` removes the line for an Ethernet driver (if any) and adds one for the SLIP diver. At the `C>` prompt, type **`type config.sys`**, and look for a line in the file similar to:

```
DEVICE=C:\NFS\SLIP.SYS /p1 /b9600
```

where `/p` specifies the COM port number and `/b` specifies the baud rate you chose during installation.

In addition, the line that identifies the `PCNFS.SYS` driver will have a `/x` switch appended to it.

You can now connect to your server using dial-up SLIP.

## Using SLIP over a Dial-up Connection

Once your SLIP dial-up connection software is installed, and your network administrator has configured a Sun system as a SLIP gateway, you can connect to your server and run PC-NFS.

This section includes the dial-up procedure; gives a sample dial-up session; and explains some of the advanced dial-up information you might need to use.

When you start a dial-up connection to a server, you specify the profile name used by the `connect` command to establish the connection. If you need to see a list of available profile names, you can either:

- Read the DOS file `SLIPCONF.DB`. At the `C:\NFS>` prompt, type **`TYPE SLIPCONF.DB`**. The first item on each line is the profile name.

  or

- Read the Networks Dial-up menu in the `nfsconf` program. At the `C:\NFS>` prompt, type **`nfsconf`** and select `Dial-up` on the Networks menu.

To dial up a server:

1. Install the modem according to the manufacturer's instructions. (Connect the modem to the serial port on your PC. If the modem is internal, connect the telephone line to the serial port on your PC.)
2. At the `C>` prompt, type **`connect`** ***`profilename`*** and press Enter, where *profilename* is a profile name you specified during installation.
3. You are prompted to enter your password. Enter your password and press Enter. The `connect` program executes, and your PC displays a message telling you that it is attaching to the server via a gateway.
4. When the PC is successfully connected and the `C>` prompt returns, you can use PC-NFS.
5. When you finish your work, type **`hangup`** and press Enter. This disconnects you from the server.

If the `connect` program fails, you may need to modify the dialog the `connect` program uses. See the section "Advanced Dial-up Information" in this chapter.

**Modems and NFS file sharing.** You must have an error-correcting modem to use NFS file sharing (accessing remote file systems using the commands `mount` or `net use`) over a dial-up connection. In addition, NFS file sharing is automatically disabled if your modem runs at less than 9600 baud. You can override this manually by using **`connect -n`** ***`profilename`***.

Note that you can run `ftp`, `telnet`, `rsh`, `rcp`, or PC-NFS LifeLine without NFS file sharing.

## A Sample Dial-up Session

When you type **`connect`**, a *dialog*, or electronic conversation, occurs between your PC and your server. If you type **`connect -d`** ***`profilename`***, you see the whole dialog on your screen. In the following sample dialog, the user “mary” with the password “littlelamb” on the PC “groucho” connects to the gateway “harpo".

| What you see on the screen | What it means |
|---|---|
| `C>connect -d harpo` | To connect to the server harpo and see the whole dialog, type **`connect -d`** and the profilename **`harpo`**. |
| `Connecting via COM2 at 1200` | PC will try to connect to the server using serial port COM 2 at 1200 baud. |
| `Enter password for user mary`<br>`   on system harpo` | PC prompts you to enter your password. |
| `Password: **********` | As you type your password, the PC displays *'s. |
| `Dialing ...` | `connect` prepares to dial the server. |
| `ATE0V0Q0` | `connect` initializes PC modem. |
| `FLUSHING:` | `connect` discards result code from PC modem. |
| `END FLUSH` | `connect` finishes discarding result code. |
| `ATS0=255S12=255` | `connect` completes PC modem initializing. |
| `EXPECT:` | PC modem is ready to dial. |
| `ATDT9, 5551234` | `connect` instructs the PC modem to dial the telephone number from profile harpo. |
| `EXPECT:` | PC waits for connection to be established. |
| `:::` | ... |

A Sample Dial-up Session (*continued*)

| **What you see on the screen** | **What it means** |
|---|---|
| `Connection established.`<br>`  Logging in...` | `connect` reports the connection is established. |
| `EXPECT: ogin:` | PC expects the end of a login prompt. |
| `:::` | ... |
| `harpo login: mary` | The server sends the login prompt and the PC sends the login name "mary" |
| `EXPECT: ssword:` | PC expects the end of a password prompt. |
| `:::` | ... |
| `Password: littlelamb` | The server sends the password prompt and the PC returns the password "littlelamb." |
| `EXPECT:%` | PC expects the UNIX prompt %*. |
| `Welcome to harpo` | The server displays a greeting, or banner. |
| `harpo%` | Login is complete. |
| `PAUSE` | `Connect` waits a moment to allow further output to complete. |
| `/etc/sunslip` | `connect` sends the command to run the program `/etc/sunslip.` |
| `EXPECT: SUNSLIP` | PC waits for the `sunslip` program to send the keyword SUNSLIP. |
| `::: /etc/sunslip`<br>`SUNSLIP` | The server echoes the last command. The gateway sends the keyword SUNSLIP. (This is often combined with the next message.) |

* The percent sign (%) is the default prompt for a successful SLIP connection. You can change this prompt by editing the `slipconf.db` file.

### A Sample Dial-up Session (*continued*)

| What you see on the screen | What it means |
|---|---|
| `Logged in successfully.`<br>`Establishing serial network configuration...` | `connect` works on network configuration. |
| `EXPECT:` | PC waits for a message from `sunslip`. |
| `:::` | ... |
| `EXPECT:` | ... |
| `:::Attaching groucho to harpo` | `sunslip` tells the PC what configuration to use, and that it is starting SLIP. |
| `Attaching groucho to harpo` | `connect` repeats the previous message. |
| `[PC-NFS Installed]`<br>`WARNING...` | `connect` starts PC-NFS.<br>At low speeds, `connect` advises you of restrictions on using PC-NFS |

## Advanced Dial-up Information

**Dialogs and the `slipconf.db` file.** When you issue a `connect` command, it starts a dialog between your PC and your server. The dialog consists of data the PC *sends* to the server and data the PC *expects to receive* in return from the server. The purpose of the dialog is to log you on to the server. You can see the complete dialog between your PC and the server by using **`connect -d`** ***`profilename`***.

PC-NFS provides a default dialog. In most cases, you will be able to use this default dialog. If the default dialog is incorrect for your specific server (for example, your server may have a different prompt than the default UNIX prompt for a SLIP connection, which is %), you must create your own dialog to be able to connect.

The default dialog is:

```
ogin: $u ssword: $p % \2/etc/sunslip SUNSLIP
```

This items in this dialog mean:

| Entry | Description |
|---|---|
| `ogin:` | PC expects the end of a login prompt |
| `$u` | PC sends the user ID |
| `ssword:` | PC expects the end of the password prompt |
| `$p` | PC sends the password |
| `%` | PC expects the UNIX prompt `%` |
| `\2/etc/sunslip` | PC sends instruction to wait two seconds, then run the program `/etc/sunslip` |
| `SUNSLIP` | PC expects the synchronization message from `sunslip` |

The characters in this dialog, such as `$u`, are described more completely in the following section "Editing the `slipconf.db` file."

If you cannot use this default dialog, you create a customized dialog by editing the DOS file `slipconf.db`. This file contains the profile information you entered at installation, and some additional items added by the `nfsconf` program.

An example of a `SLIPCONF.DB` file with a profile that uses the default dialog is:

```
sun-abc 9,667-1234 sjones * 60 * Y
```

where:

`sun-abc` = profile name
`9,667-1234` = telephone number of the server
`sjones` = userid
`*` = you will be prompted for a password
`60` = connection timeout, in seconds
`*` = no batch file is being started up
`Y` = yes, use the default login

The following example compares the profile shown above with a profile that uses a custom dialog:

```
sun-abc 9,667-1234 sjones * 60 * Y

system1 555-9876 nfstest * 60 * N ogin: $u ssword:
$p > \2 /etc/sunslip SUNSLIP
```

Note that the second entry, which has the customized dialog, contains an N after * 60 *. All customized dialogs must contain an N in this position, to indicate that the default login is *not* being used. The customized dialog for the login follows the N.

**Editing the `SLIPCONF.DB` file.** The `SLIPCONF.DB` file is a regular text file. Normally, you won't have to do anything with this file. However, there are certain conditions when you may need to edit it:

- If you can't use the default login of your server
- If you want to delete a profile
- If data in the file is accidentally corrupted

Use an ASCII editor (such as Edlin) to edit this file. Each entry is separated by one space. Do not insert any embedded spaces or tabs in this file, or the profile will be unusable.

The following characters have special meaning in a `SLIPCONF.DB` file:

| Character | Meaning |
|---|---|
| `\n` | send a new line |
| `\r` | send a carriage return |
| `\s` | send a space |
| `\b` | cause a short break on the line |
| `\t` | send a tab |
| `\1 - \9` | pause the indicated number of seconds |
| `\xXX` | send the character whose hexadecimal code is XX |

A *send* string is normally followed by a carriage return. If you want to suppress the carriage return, end the send string with a backslash. For example, if the user ID is xyz, a send string of:

```
AB$uCD
```

would send the string:

```
ABxyzCD<carriage return>
```

while a send string of:

```
AB\2C\
```

would send the string:

```
AB[pause 2 seconds]C
```

The last expected string must be `SUNSLIP`. Once the PC receives this string, the `connect` program gathers the network configuration information from the server and starts PC-NFS.

## Switching between Serial and Ethernet Connections

After PC-NFS is installed, you can configure PC-NFS for either serial or Ethernet operations. Once you've installed serial communications software, you can switch back to Ethernet operations if you want. You might do this, for example, if you bring your PC home to do some work, and then return it to your regular workplace and reconnect to the Ethernet.

*Remember that because the SLIP network and the Ethernet are two distinct networks, your PC has a different network name and Internet address for each mode.* This may affect network applications, such as PC-NFS LifeLine mail. For example, mail sent to your PC's Internet address on an Ethernet may not be available when you take your PC home and connect it to your SLIP network. If you regularly switch your PC between serial and Ethernet operations, you may want to receive all your mail on a server.

### To Switch from Serial Mode to Nonserial Mode

1. If your PC contains diskette drives only:

   a. Insert the PC-NFS Installation diskette into drive A.

   b. At the drive A DOS prompt (`A>`), type **`install -a`** and press Enter. The Connections menu appears.

   c. Highlight `Ethernet` and press Enter. Continue with step 2.

   If PC-NFS is installed on a hard disk:

   a. At the DOS prompt, type **`nfsconf`** and press Enter.

   b. Select the Connections menu, and highlight `Ethernet.` Press Enter. Continue with step 2.

2. On the next screen, enter the Ethernet adapter you will use.

3. On the next screen, enter the information required for the Ethernet adapter you will use.

4. Choose `Y` to accept or `N` to reject the configuration you completed.

   If you type `Y`, and this is the first time you are installing this Ethernet connection, the next screen asks you to specify the drive into which you will insert the Connections diskette. Enter the drive letter, insert the Connections diskette into that drive, and press any key. Continue with the next step.

   If you type `Y` and you have already installed this Ethernet connection, continue with the next step. If you type `N`, you return to step 3 above.

5. Choose `Y` to accept or `N` to reject the configuration you completed.

   If you type `Y`, continue with the next step. If you type `N`, you return to step 3 above.

6. If you have not previously configured the network portion (such as IP address) of PC-NFS, then continue with the network configuration described in Chapter 2 of *Installing PC-NFS, A Guide to the User and System Administrator*. Otherwise, highlight `Quit` and press Enter.

7. Remove any PC-NFS diskettes. Reboot the PC (if you're using a diskette-only system, you must insert your boot diskette).

Whenever you create a new `CONFIG.SYS` file by switching between serial and nonserial operations using `nfsconf`, the last `CONFIG.SYS` file is saved in a file named `CONFIG.OLD`.

If you regularly switch your PC between Ethernet and SLIP connections, you can avoid the need to run nfsconf each time you switch connections by doing the following:

- Save copies of the `CONFIG.SYS` file that you use for each type of connection. For example, you could save your Ethernet `CONFIG.SYS` file as `CONFIG.ETH`, and your SLIP `CONFIG.SYS` file as `CONFIG.SLP`.
- When you switch connections, instead of running the `nfsconf` program, copy the appropriate file (`CONFIG.ETH` or `CONFIG.SLP`) to the file name `CONFIG.SYS` in order to use the connection configured in that file.

Note: This procedure makes it unecessary to perform driver reconfiguration each time you switch connections. However, you may still need to change your network configuration.

## To Switch from Nonserial Mode to Direct Serial Mode

1. If your PC contains diskette drives only:

   a. Insert the PC-NFS Installation diskette into drive A.

   b. At the drive A DOS prompt (`A>`), type **`install -a`** and press Enter. The Connections menu appears.

   c. Highlight `Serial` and press Enter. Continue with step 2.

   If PC-NFS is installed on a hard disk:

   a. At the DOS prompt, type **`nfsconf`** and press Enter.

   b. Select the Connections menu, and highlight `Serial`. Press Enter. Continue with step 2.

2. On the next screen, highlight `Direct` and press Enter.

3. Enter the number of the COM port (1 or 2) you will be using and the baud rate of the serial line.

4. Choose `Y` to accept or `N` to reject the configuration you completed.

   If you type `Y`, and this is the first time you are installing either a direct or dial-up connection, the next screen asks you to specify the drive into which you will insert the Connections diskette. Enter the drive letter, insert the Connections diskette into that drive, and press any key. Continue with the next step.

   If you type `Y` and you have already installed a serial connection, continue with the next step. If you type `N`, you return to step 3 above.

5. Choose `Y` to accept or `N` to reject the configuration you completed.

   If you type `Y`, continue with the next step. If you type `N`, you return to step 3 above.

6. If you have not previously configured the network portion (such as IP address) of PC-NFS, then continue with the network configuration described in Chapter 2 of *Installing PC-NFS, A Guide to the User and System Administrator*. Otherwise, highlight `Quit` and press Enter.

7. Remove any PC-NFS diskettes. Reboot the PC (if you're using a diskette-only system, you must insert your boot diskette).

## To Switch from Nonserial Mode to Dial-up Serial Mode

1. If your PC contains diskette drives only:

   a. Insert the PC-NFS Installation diskette into drive A.

   b. At the drive A DOS prompt (`A>`), type **`install -a`** and press Enter . The Connections menu appears.

   c. Highlight `Serial` and press Enter . Continue with step 2.

   If PC-NFS is installed on a hard disk:

   a. At the DOS prompt, type **`nfsconf`** and press Enter.

   b. Select the Connections menu, and highlight `Serial.` Press Enter. Continue with step 2.

2. On the next screen, highlight `Dialup` and press Enter.

3. Enter the number of the COM port (1 or 2) which is connected to the modem and the baud rate of the modem you are using.

4. Choose `Y` to accept or `N` to reject the configuration you completed.

   If you type `Y`, and this is the first time you are installing either a direct or dial-up connection, the next screen asks you to specify the drive into which you will insert the Connections diskette. Enter the drive letter, insert the Connections diskette into that drive, and press any key. Continue with the next step.

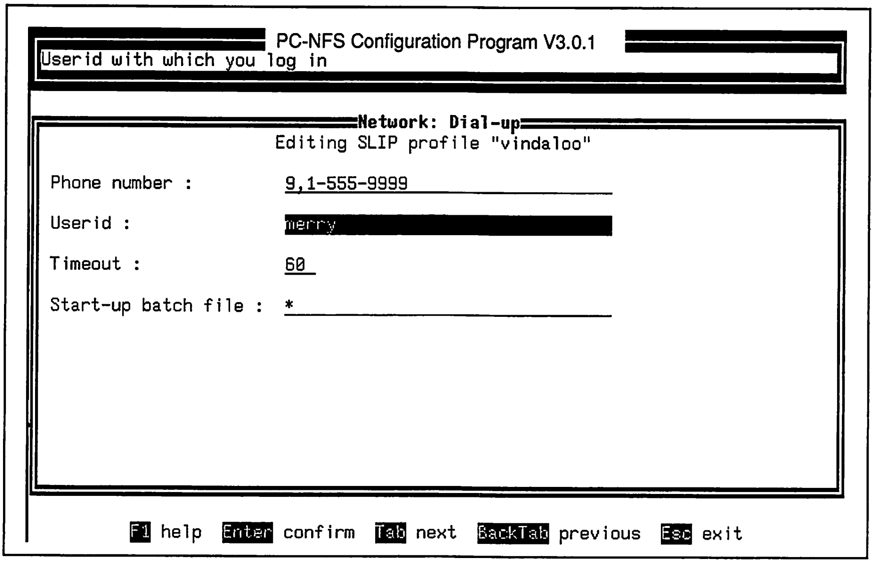
   If you type `Y` and you have already installed a serial connection, continue with the next step. If you type `N`, you return to step 3 above.

5. Choose `Y` to accept or `N` to reject the configuration you completed.

   If you type `Y`, continue with the next step. If you type `N`, you return to step 3 above.

6. Use the arrow keys to move to the Networks menu and highlight `Dial-up`. Press Enter.

7. Type the dial-up connection profile name and press Enter. Your screen should look like this:



```
PC-NFS Configuration Program V3.0.1
Userid with which you log in

Network: Dial-up
Editing SLIP profile "vindaloo"

Phone number :            9,1-555-9999
Userid :                  merry
Timeout :                 60
Start-up batch file :     *
```

8. Enter the Phone number, Userid, and Timeout; the Start-up batch file name is an optional entry.

9. Choose `Y` to accept or `N` to reject the configuration you completed.

   If you type `Y`, continue with the next step. If you type `N`, you return to step 3 above.

10. If you have not previously configured the network portion (such as IP address) of PC-NFS, then continue with the network configuration described in Chapter 2 of *Installing PC-NFS, A Guide to the User and System Administrator*. Otherwise, highlight `Quit` and press Enter.

11. Remove any PC-NFS diskettes. Reboot the PC (if you're using a diskette-only system, you must insert your boot diskette).

You can change an existing profile by selecting the profile name you want to change in the Networks Dial-up menu.

# Diskette-only Installation

This section provides information you need to install PC-NFS on a diskette-only PC.

## Creating a Bootable DOS Diskette

If you are installing PC-NFS on a diskette-only PC, you need to prepare a bootable DOS diskette before you run the PC-NFS installation program. To do this, use the DOS `Format` command, located on your DOS distribution diskette.

To create a bootable DOS diskette:

1. Insert the DOS distribution diskette into drive A.
2. Insert a blank, unformatted diskette into drive B.
3. At the drive A DOS prompt, type:

   ```
   format b: /s
   ```

   and press Enter. The following message is displayed.

   ```
   Insert new diskette for drive B:
   and strike ENTER when ready
   ```

4. Press Enter. When the formatting is completed, your screen should appear similar to that shown below:

   ```
   A>format b: /s
   Insert new diskette for drive B:
   and strike ENTER when ready

   Formatting...Format complete
   System transferred

   362496 bytes total disk space
   40960 bytes used by system
   321536 bytes available on disk
   ```

## Copying the `ANSI.SYS` File

Copy `ANSI.SYS` from the DOS distribution diskette to the root directory of the new diskette. The PC-NFS utilities all use ANSI control codes to format their screen displays. For this to work, you must have a copy of the `ANSI.SYS` device driver (distributed with your PC-DOS or MS-DOS system) installed in your root directory.

## Running PC-NFS Utilities

If you are installing PC-NFS on diskette-only system, you do not have room on a single diskette for all of the software that PC-NFS provides. To use additional PC-NFS software you can:

- Load the appropriate PC-NFS diskette into your second drive, and run it from that drive.
- Put the additional software on a remote file system and access it from there.

After you complete the installation, see Chapter 3, "Tailoring Your System," in *Installing PC-NFS, A Guide to the User and System Administrator* for more information about executing PC-NFS utilities from a remote file system.

**On a single diskette drive PC:** To run PC-NFS utilities on a single diskette drive PC, you must install and run the software on a remote file system.

Because of limited space on the PC-NFS diskettes, screen messages and prompts for PC-NFS utilities are located on the Program diskette that you create during installation. To run the utilities from diskette you must have two drives: one for the utilities, and one for the program diskette. If you run PC-NFS utilities from a single diskette drive, messages similar to the following appear:

```
PC-NFS Message #221%
PC-N A. PC-NFS Message #225%
     B. PC-NFS Message #225%
PC-NFS Message #197%
```

## PC-NFS Installation

To continue PC-NFS installation, use the procedures in "Direct Connection Installation" or "Dial-up Connection Installation" earlier in this Chapter.

# Appendix A - Troubleshooting

A

This appendix explains how to diagnose and remedy problems with a SLIP connection. The appendix begins with a section on things that are easy to check so that you can quickly locate the source of a problem. A section with commands for displaying troubleshooting information follows. The last two sections describe how to solve problems indicated by either SLIP symptoms or error messages.

For an example of the procedure for setting up a complete SLIP network, see Chapter 3.

## Things to Check First

When you have a problem with a SLIP connection, you should begin by checking your equipment, modem, telephone system, and SLIP files.

### Equipment

Your equipment may be incorrectly connected or it may be malfunctioning.

- Make sure that all of your connections are tight. For example, check the lines running from both the serial port and the telephone to the modem.

- Check each piece of equipment to verify that it is operating correctly.

## Modem

The modem on either your PC or its gateway may be working improperly.

- Make sure the modem settings are correct. Because there are no standards for modems, each manufacturer uses its own modem commands. Having the same brand of modem at both ends of a SLIP connection helps ensure correct communication.
- Run diagnostics tests on the modem, if available.

There are a number of problems that may occur when you use a 9600 baud modem with SunOS. These include:

- Inability to establish a connection
- Failure to hang up when the carrier is lost
- Repeated reset of the modem by the SunOS software

Many of these symptoms have been seen in the Hayes V series. If you have problems on the PC end, you can use the `connect -i` option when you establish your connection. This gives you interactive control over the modem setup and call connection.

To use `connect -i`:

1. Type **`connect -i`**, and Press (Enter). The following messages are displayed:

   ```
   Connecting via [COMport] at [Baudrate]
   Interactive mode (F1 for help)
   ```

   Where `COMport` is the communications port you are using (COM1 or COM2), and `Baudrate` is the baud rate you are using.
2. Dial your server using the correct protocol for your modem. For example, if you are using a Hayes modem, type:

   **`atdt`** ***`Telephone Number`***

   Where `Telephone Number` is the phone number for your server.
3. After the connection is successfully established, the following message is displayed:

   ```
   CONNECT [Baudrate]
   ```
4. Press (Enter) to display the login prompt.
5. Log in to the server.

6. Press F1 to display the `connect -i` help menu:

```
Function key assignments:

  F1 - Help.
  F2 - Quit.
  F3 - Sends a <return> and switches into SLIP mode.
         Use this if your host SLIP initiation program
         is not called '/etc/sunslip'. Type the name
         of the program and press F3 instead of
         <return>.
  F4 - Runs the program '/etc/sunslip' and enters
         SLIP mode.
  F5 - Turns off DTR on the serial port (hangs up).
  F6 - Turns on DTR on the serial port.
  F7 - Sends a break on the comm line for 1/4 second.

Once you press F3 or F4 the CONNECT program will
wait for up to 30 seconds for SLIP configuration to
complete.
```

7. When you installed SLIP, the program `sunslip` was placed in the `/etc` directory. If you are using this default configuration, press F4.

   If you have changed the name of the `sunslip` program, or have moved it to a directory other than `/etc`, press F3.

   A SLIP connection is established, and the DOS prompt is displayed.

If you need assistance with any part of this procedure, see your Network Administrator.

## Telephone System

An unusual aspect of your telephone system itself (such as multiple relays) can cause a connection problem.

## SLIP Files

SLIP files on both the PC and its gateway must contain complete, correct data for the PC and the gateway to connect. To observe the dialog between your PC and its gateway, use the **-D** option with the **CONNECT** command on the PC:

**CONNECT -D** ***PROFILENAME***

# Information for Troubleshooting

When troubleshooting a SLIP connection, you may find it helpful to display network information, such as host names and addresses, network interfaces, and host status. Table A-1 lists the kinds of information that you can display and both the server and PC commands for doing so.

**Table A-1** *Commands for Displaying Troubleshooting Information*

| To Display This Information | On the Server | On the PC |
|---|---|---|
| Host names and IP addresses, if running Yellow Pages (YP) | `ypcat hosts` | `ypcat hosts` |
| Host names and IP addresses, if not running YP | `cat /etc/hosts` | |
| Network interfaces and packet status | `netstat -r` | `NETSTAT -I` |
| Status of host | `ping hostname` | `NFSPING hostname` |
| Status of dial-up SLIP sessions | `/etc/dslipuser` | |

For troubleshooting information and annotated error messages for PC-NFS, refer to *Installing PC-NFS, A Guide to the User and System Administrator.*

## Symptoms and Solutions

Table A-2 lists SLIP symptoms and the solutions for them. The symptoms are grouped into the following categories:

- Installation (server)
- Direct Connection
- Dial-up Connection

**Table A-2** *Symptoms and Solutions*

| **Symptom** | **Solution** |
|---|---|
| *Installation:* | |
| You stop the server installation script before completing the SLIP installation | Run the script using the `addslip.csh` command as you did before. *If you backed up your system files and copied the SLIP versions during the first installation, don't do it again, or you will lose your original files.* Continue the installation. |
| *Direct Connection:* | |
| PC cannot communicate with any server other than its SLIP gateway | You may be using the SLIP server kit supplied with PC-NFS 3.0. Upgrade to PC-NFS 3.0.1 or update the routing information in the `/etc/gateways` file on each server running SunOS 3.*x*. |
| Slow SLIP connection | As stated earlier in this guide, SLIP connections are much slower than Ethernet connections. The fastest speed at which data can run over a SLIP connection is 9600 baud, or 9,600 bits per second. In comparison, data can run over an Ethernet line at 10,000,000 bits per second. |

**Table A-2** *Symptoms and Solutions (continued)*

| Symptom | Solution |
|---|---|
| *Direct Connection (Cont.):* | |
| PC cannot connect to its gateway | Make sure that you are using a null modem cable. Then, on the gateway system, verify that `slattach` is running on the port by typing **`ps -ax`**. For more information, refer to Chapters 2, 3, and 4 of this guide. |
| *Dial-up Connection:* | |
| PC cannot connect to its gateway | Verify that the modems on both systems are set up correctly by using another program, such as Procomm or Smartcomm, to establish a connection. |
| The PC cannot connect to its gateway even though it did so before | The gateway's telephone line may be busy. Try again later, or call the Network Administrator to find out if the line is being used. Next, make sure that the gateway is running the SLIP software. |
| PC cannot communicate with any server other than its SLIP gateway | You may be using the SLIP server kit supplied with PC-NFS 3.0. Upgrade to PC-NFS 3.0.1 or update the routing information in the `/etc/gateways` file on each server running SunOS 3.*x*. |
| Slow SLIP connection | As stated earlier in this guide, SLIP connections are much slower than Ethernet connections. The fastest speed at which data can run over a SLIP connection is 9600 baud. |

**Table A-2** *Symptoms and Solutions (continued)*

| Symptom | Solution |
|---|---|
| *Dial-up Connection (Cont.):* | |
| A `login incorrect` message appears on PC screen even though the PC is connected to its gateway | You may have entered the wrong password; try logging in again. If that doesn't work, make sure that your login name in the profile is correct. |
| The PC can send IP packets, but its gateway does not receive them | Make sure that `sunslip` is running on the gateway. Then, still on the gateway, use the **`/etc/dslipuser`** command to make sure that the connection with the PC is still active. |
| Nonsense characters or garbage appear on PC screen | Your phone connection may be a noisy one. Hang up and try again. If that doesn't work, make sure that the speed listed in the profile is the same baud as your modem's speed and the same speed specified for the tty line in the server. |
| The `net use` or `nfsconf mount` command does not work on your PC, but `telnet`, `rsh`, `ftp`, and `rcp` do | At speeds of less than 9600 baud, PC-NFS disables NFS facilities that use UDP. If you are using an error-correcting modem at both ends of the connection, you can override this setting by using **`CONNECT -N`**. |

**Table A-2** *Symptoms and Solutions (continued)*

| **Symptom** | **Solution** |
|---|---|
| *Dial-up Connection (Cont.):* | |
| The PC display indicates that you are logging in to the gateway, but your connection times out before starting SLIP | Check the `/etc/motd` file to see if it includes a percent character (`%`). If it does, remove the `%`, because SLIP interprets it as a prompt. If necessary, see your System Administrator for assistance.<br>If your prompt is something other than a percent sign (`%`), edit your `.login` file and change the prompt to `%`. SLIP looks for `%` as the default prompt.<br>The `/etc/sunslip` program could not be found on the server. If the file is not installed, run the server installation. |

## Error Messages and Solutions

This section lists each SLIP error message and a solution for the problem it describes. You can carry out some solutions on your PC; others require access to your SLIP gateway. If you cannot solve a problem yourself, copy the error message and give it to your Network Administrator. This information will help your administrator to solve the problem as quickly as possible.

```
A conflict exists between your HOSTS file and the addresses assigned by the SLIP server. The server claims that address <addr1> corresponds to the name <name1>; your HOSTS file says this should be <name2>.
```

The `CONNECT` command displays this message when the host name `<name1>` in your PC's `\NFS\HOSTS` file does not match the host name assigned to the address `<addr1>` in the gateway's SLIP configuration information. Change `<name1>` in the `\NFS\HOSTS` file on your PC to `<name2>` so that it matches the gateway's SLIP information, then try to connect again.

```
A conflict exists between your HOSTS file and the addresses assigned by the SLIP server. The server claims that the name <name1> corresponds to the address <addr1>; your HOSTS file says this should be <addr2>.
```

The `CONNECT` command displays this message when the host IP address `<addr1>` in your PC's `\NFS\HOSTS` file does not match the address assigned to host name `<name1>` in the gateway's SLIP configuration information. Change `<addr1>` in the `\NFS\HOSTS` file on your PC to `<addr2>` so that it matches the gateway's SLIP information, then try to connect again.

```
CONNECT error: Can't open <hostfile>
```

The `\NFS\HOSTS` file exists on your PC, but `CONNECT` could not open it. Check to see if the file or disk is full, or if it is read-only.

```
CONNECT error: Can't open <hostfile> to append new data
```

`CONNECT` determined that it needed to add new hosts information to the `\NFS\HOSTS` database, but could not open it to append the data. Check to see if the file or disk is full, or if it is read-only.

```
CONNECT error: Incomplete config. record (even no. of
   dialog fields) or (missing fields)
```

This message occurs when you try to edit the profile database "by hand" and do so incorrectly. The profile record in the `SLIPCONF.DB` database on your PC is incorrect. Use `NFSCONF` to edit the profile, then try to connect again. If this does not work, use a text editor to remove the offending line and run `NFSCONF` to re-create the database.

```
CONNECT error: Malformed reply from server
```

The `CONNECT` command could not process the configuration information sent by your gateway. The data was probably corrupted by line noise. Try again. If the problem recurs, ask the System Administrator for the network you are trying to reach to check the gateway software to see why it is sending invalid data. In particular check `/etc/sunslip`.

```
CONNECT error: No configuration on file for <profile>.
```

The profile name that you supplied in the `CONNECT` command line does not correspond to any profile stored by `NFSCONF`. Rerun `CONNECT` with the correct profile name, or use `NFSCONF` to edit or create the profile, then try to connect again.

```
CONNECT error: System is not configured for SLIP seri-
   al operation.
```

Your PC is not configured for SLIP. Configure it by following the instructions for installing and using SLIP on your PC in Chapter 4 of this guide.

```
CONNECT error: Terminated by user
```

You terminated the connection prematurely by typing Ctrl Break.

```
CONNECT Error: Time limit expired before connection
   was established
```

1) When you are using the default dial-up profile, the default timeout of 60 seconds may not be not long enough for the profile to run. Change the profile using `nfsconf` to make the timeout longer.

2) When you are using the default dial-up profile, the prompt that the PC receives from the gateway may be different than SLIP's default prompt of `%`, which the PC expects. Edit the `slipconf.db` file to include the prompt that your gateway is responding with.

`CONNECT error: Unable to open SLIP configuration database <file>`

The SLIP configuration file `SLIPCONF.DB` does not exist. Run `NFSCONF` to create one or more profiles, then try again.

`Dialup connection failed: Bad status from modem`

The signals to the modem are still active and the modem can't be initialized. Disconnect the telephone line from the modem and reconnect it, or turn the modem off then on, and try again.

`Dialup connection failed: NO CARRIER`

1) Check to be sure the modem is connected at the server end.

2) Make sure the telephone number in the profile matches the server's telephone number.

`Dialup connection failed: <modem-output>`

Your modem cannot connect to the remote system; it has detected a problem and displays the message `<modem-output>` to give the reason for the failure. The messages for each modem are different, so look for an explanation in the documentation for the modem.

`HANGUP error: System is not configured for SLIP serial operation.`

Your PC is not configured for SLIP. Configure it by following the instructions for installing and using SLIP on your PC in Chapter 4 of this guide.

`WARNING: Remote file access over a dial-up line without adequate error-correction may lead to data corruption.`

You are using SLIP over a low-speed dial-up link, but you chose to enable NFS file sharing with the `-n` switch. This message is displayed to remind you of the risks of doing this.

```
WARNING: To avoid possible data corruption over a low-
   speed dial-up connection, NFS file access has been
   disabled.
```

You are using SLIP over a low-speed dial-up link, and you did not enable NFS file sharing with the `-n` switch. This message is displayed to remind you that only TCP-based services such as `ftp`, `rcp`, `rsh`, `telnet`, and PC-NFS LifeLine mail can be used over a low-speed dial-up link, unless you use the `-n` switch.

```
Warning: <hostfile> not found. A new copy will be cre-
   ated.
```

This warning is displayed if the `\NFS\HOSTS` file is not present. The `connect` program re-creates the file, so you should have no problem using SLIP.

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